For Discussion Purposes Only:
Suggested Re-Organization Of BDCP Goals And Objectives With The Aim Of Simplifying
(3-22-09, Carl Wilcox)

WORKING DRAFT
BDCP HCP/NCCP Biological Goals and Objectives

Note: *This handout presents revised biological goals and objectives recommended by the Biological Goals and Objectives Working Group for incorporation into the Working Draft Chapter 3, Conservation Strategy. These biological goals and objectives will continue to be revised to incorporate goals and objectives for terrestrial species and in response to new information derived from analyses to be conducted in early 2009 (e.g., results of DRERIP evaluations, results of the impact assessment).*

The conservation strategy is designed to achieve the biological goals and objectives established at the ecosystem level and for each naturl community and the covered species that each community supports. Goals are broad, guiding principles based on conservation needs of the resources. Objectives are expressed as conservation targets or actions. Objectives are measurable and achievable within a given time frame; they clearly state a desired result and will collectively achieve the biological goals.

Biological goals for covered species are required by the Federal 5-Point Policy to be included in HCPs (65 FR 35242, June 1, 2000).

Objectives are meant to be clear, succinct, and measurable.

Ecologically Hierarchical Organization of Biological Goals and Objectives

The biological goals and objectives are organized hierarchically, on the basis of ecological scale, as follows:

1. Ecosystem Goals and Objectives
    2. Natural Community Goals and Objectives
        3. Species-Specific Goals and Objectives

The scope of each ecological scale is as follows:

- **Ecosystem Goals and Objectives.** Ecosystem goals and objectives are focused on improvements to the overall condition of hydrological, physical, chemical, and biological processes in the Delta. ~~in support of achieving goals and objectives for covered natural communities and covered species.~~

- **Natural Community Goals and Objectives.** Natural community goals and objectives are focused on maintaining or enhancing ecological functions and values of covered natural communities. Achieving natural community goals and objectives will ~~also serve to conserve~~improve the habitat of associated covered species and other native species.

- ~~**Specific**~~ **Species Goals and Objectives.** Species-specific goals and objectives address species-specific stressors and habitat needs that are not addressed under the higher order ecosystem and natural community goals and objectives and species-specific viability parameters as they relate to life stage occurrence of covered fish species in the Delta.

Ecosystem Goals and Objectives

Goal ECSY 1: Provide hydrodynamic conditions within Delta waterways that ~~contribute to viable populations of covered fish species~~ restore natural patterns of flow within and outside the BDCP planning area.

Problem Statement: *Current Hydrodynamic conditions within the Delta act as ecosystem stressors by affecting ~~affect covered fish~~ species ~~stressors associated with life stage~~ movement among habitats~~,~~ (straying), natural hydraulic variability, limiting habitat availability and suitability ~~habitat conditions~~, creating conditions favoring non-native invasive species, and limiting food production. ~~Maintaining or~~ Iimproving these hydrodynamic functions, so they are naturally dynamic, will relieve the adverse effects of these stressors ~~on covered fish species~~on the Delta ecosystem and covered species.*

***Covered species benefiting**: Delta Smelt, longfin smelt, splittail, all runs of Chinook, steelhead, green and white sturgeon.*

Objective ECSY1.1: Provide hydrodynamic conditions that support the movement of larval and juvenile life stages of covered fish species to downstream rearing habitats.

Objective ECSY 1.? (~~5.1~~): Provide the hydrodynamic, salinity, and other water quality conditions within the Delta that maintain or restore suitable habitat and and support effective movement of all life stages of covered fish species between spawning, incubation, , rearing, and foraging habitat areas.

Objective ECSY ? (~~CHIN3.1~~): Providing for flows through the Delta that reflect the variability present in the natural hydrograph to maintain or increase life history diversity of all runs of Chinook salmon and provide for a diversity of rearing conditions for all runs of Chinook salmon, steelhead, and green and White Sturgeon over time.

Objective ECSY ? (~~CHIN4.1~~): Increase the proportion of all runs of adult Chinook salmon, Steelhead, green and white sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats by providing conditions that minimize occurrences of false attraction into non-natal basins.

Objective ECSY1.2: Provide hydrodynamic conditions that support the movement of adult life stages of covered fish species to upstream spawning habitats.

Objective ECSY1.3: Provide a range of salinity conditions that support habitat and food production for covered fish species.

Objective ECSY1.4 (~~DESM1.1DESM1.3~~): Increase habitat availability for all delta smelt life stages in the Delta and Suisun Marsh/Bay. Maintain the existing distribution of delta smelt in the Delta and Suisun Bay and expand the distribution of delta smelt in the eastern and southern Delta such that the number of gravid and spent adult delta smelt sampled from Spring Kodiak Trawl Eastern and Southern Zone survey stations is similar to that sampled from [year] to [year].

Objective ECSY 1.5. (~~LOSM1.3~~): Increase habitat availability for longfin smelt spawning and rearing in the Delta and Suisun Marsh/Bay.

Objective ECSY 1.? (~~GECF1.2~~: Reduce the effects for CVP and SWP operations on the ecosystem and entrainment of covered fish species.

Goal ECSY 2: Increase aquatic primary and secondary production in the Delta to increase the abundance and availability of food for all life stages of covered fish species.

Problem Statement: *Current hydrodynamic conditions, water quality, quantity of functional inter-tidal and floodplain habitat, and the presence of non-native invasive species ~~Insufficient~~ limit primary and secondary production ~~is hypothesized to be an important stressor~~ in the Delta affecting its ability to support ~~on~~ delta smelt, longfin smelt, ~~and~~ juvenile salmonids and other native species. Increasing primary and secondary production will improve food web processes and the availability and abundance food items at multiple trophic levels ~~for covered fish species~~.*

Covered species benefiting: *Delta smelt, longfin smelt, all runs of salmon, steelhead, green and white sturgeon, splittail, Pacific lamprey.*

The following ecosystem and natural community objectives that also contribute towards achieving this goal: ECSY1.3, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective ECSY2.1: Over the term of the BDCP, increase the abundance of zooplankton species that provide food and support food production for covered fish species in Delta waterways.

Goal ECSY 3: Reduce the adverse effects of non-native ~~species~~ predators and competitors and species which modify habitat to support them in ~~on~~ the Delta's aquatic ecosystem. ~~and the productivity, abundance, distribution of covered fish species.~~

Problem Statement: *Changes in the Delta ecosystem caused by non-natives species have reduced habitat suitability (turbidity effect, changes in habitat structure), and changed predator prey and competitive relationships between native and non-native species are* ~~*Excessive levels of competition with and predation by non-native species on covered fish species is hypothesized to be*~~ *a major stressor on covered fish species* ~~*directly through predation mortality and indirectly by reducing through food abundance and availability*~~*. Reducing the adverse effects* ~~*on*~~ *of non-native species* ~~*on covered fish species*~~ *is expected to increase survival and abundance of covered fish species.*

Covered species benefiting: *Delta smelt, longfin smelt, all runs of salmon, steelhead, , .*

Objective ECSY3.1: Manage the distribution and abundance of established non-native invasive species in the Delta to reduce non-native species predation on and competition with covered fish species.

Objective ECSY3.2: Manage the distribution and abundance of established non-native invasive species in the Delta to rehabilitate aquatic ecosystem processes.

Objective ECSY3.3: Minimize the likelihood for future invasions and establishment of non-native species into the Delta's aquatic ecosystem.

Goal ECSY 4: Reduce the adverse effects of contaminants on the Delta's aquatic ecosystem ~~and the productivity, abundance, distribution of covered fish species~~.

Problem Statement: *A variety of contaminants entering Delta waterways are hypothesized to have direct lethal and sublethal effects on* ~~*life stages of covered*~~ *fish species and food web processes that adversely affect food abundance and availability. Reducing the loads of contaminants entering the Delta that are known or suspected to have these adverse effects the aquatic ecosystem is expected to increase survival and abundance of covered fish species.*

Covered species benefiting: *Delta smelt, longfin smelt, all runs of salmon, steelhead, green and white sturgeon, splittail, Pacific lamprey.*

Objective ECSY4.1: Determine through ongoing or new research the extent of effect and source of known and suspected contaminates in the aquatic ecosystem and identify measures to reduce or eliminate their effects. ~~Contribute to reducing~~

~~the load of contaminants of concern that enter the Delta in wastewater treatment plant discharges to levels in conformance with existing and future water quality standards to reduce their effects on and biological uptake by covered fish species.~~

Objective ECSY4.2: Contribute to specific actions which have a demonstrated positive effect in improving the aquatic ecosystem by reducing the load of contaminants of concern entering the Delta to levels in conformance with existing and future water quality standards.
~~Contribute to reducing the load of contaminants of concern that enter the Delta from urban sources to levels in conformance with existing and future water quality standards to reduce their adverse effects on and biological uptake by covered fish species.~~

~~**Objective ECSY4.3:** Contribute to reducing the load of methyl mercury entering the Delta from in-Delta and upstream sources to levels in conformance with existing and future water quality standards to reduce adverse effects of methyl mercury on and biological uptake by covered fish species.~~

~~**Objective ECSY4.4** Contribute to reducing the load of contaminants of concern entering the Delta from in-Delta and upstream sources from agricultural practices in conformance with existing and future water quality standards to reduce their adverse effects on and biological uptake by covered fish species.~~

~~**Objective ECSY4.5:** Coordinate efforts to detect and respond to toxic events in the Delta.~~

Goal ECSY5: ~~Provide~~ Support a properly functioning Delta ecosystem by improving~~for~~ the amount , spatial distribution, function, and connectivity of ~~covered species habitats~~natural communities across the Delta to support ecosystem productivity and the effective movement and genetic exchange of covered species within and among natural communities both inside and outside of the BDCP planning area.

Problem Statement: *Poor availability to, function of, connectivity among and accessibility to ~~habitat areas required~~natural communities within and outside the BDCP planning area ~~to fulfill the life stage requirements of covered species~~ is hypothesized to inhibit ~~the abundance and distribution of covered species and the diversity and growth of their populations~~proper ecosystem function and support for native species. ~~Maintaining~~ Expanding the availability, improving the function, connectivity between and accessibility to ~~habitat areas~~natural communities ~~that support life stage requirements~~ will enhance ecosystem processes and productivity to support improved abundance, distribution, diversity, and growth of covered species populations.*

Covered species benefiting: *Delta smelt, longfin smelt, all runs of salmon, steelhead, green and white sturgeon, splittail, Pacific lamprey, terrestrial species to be determined*

(clapper rail, black rail, delta plants associated with intertidal and flood plain, Swainsons hawk, VP species, cranes.

The following ecosystem and natural community objectives also contribute towards achieving this goal: ECSY1.1-1.3 and NACO1.1-1.5.

Objective ECSY5.1: Provide the hydrodynamic and, salinity, and other water quality conditions within the Delta that support maintain or restorethe suitable habitat and and support effective movement of all life stages of covered fish species between spawning, incubation, larval,, rearing, and foraging juvenile, and adult habitat areas.

Objective ECSY5.2: Contribute toP-rotect and expand the availability of spatially well-distributed restored floodplain, riparian, tidal marsh, and shallow subtidal aquatic, and terrestrial habitats natural communities to support increased distribution of covered species, aquatic productivity, and improved connectivity among covered species habitatsnatural communities within and adjacent to the BDCP planning area.

Covered Natural Community Goals and Objectives

Goal NACO1: Protect, enhance, and restore tidal perennial aquatic, freshwater and brackish tidal marsh, and riparian, and terrestrial communities to provide habitat and ecosystem functions to increase the natural production (reproduction, growth, and survival), abundance, and distribution of covered species.

Problem Statement: *[To come.]Habitat critical to the spawning, incubation, rearing, and foraging has been degraded around the Bay Delta, and this has restricted species distribution, life history diversity, and growth of covered species. Increasing habitats has been hypothesized to increase distribution, life history diversity and growth of covered species.*

Objective NACO1.1: Increase the frequency that floodplain habitat within the Yolo Bypass is inundated for at least __ consecutive days to approximately __ percent of years.

Objective NACO1.2: Provide for the inundation of at least __ acres of historical floodplain surfaces that have been disconnected from river channels to provide habitat and ecosystem functions that support of covered species.

Objective NACO1.3: Restore, manage, and protect at least __ acres of freshwater tidal marsh in the Delta that provides habitat and ecosystem functions in support of covered species.

Objective NACO1.4: Restore, manage, and protect __ acres of brackish tidal marsh in Suisun Marsh/Bay to provide habitat and ecosystem functions in support of covered species.

Objective NACO1.5: Restore at least __ acres of riparian forest and scrub within the Delta to provide habitat and ecological functions in support of covered species.

Goal NACO2: Conserve sufficient agricultural, grassland, natural seasonal wetland, non-tidal perennial aquatic, and non-tidal perennial permanent emergent marsh communities in the Planning Area to contribute to the conservation of associated covered species.

Problem Statement: *[To come.]*

Objective NACO2.1: Increase the extent of protected agricultural lands within the Planning Area that are managed to support habitat for associated covered species.

Objective NACO2.2: Increase the extent of protected grasslands within the Planning Area that are preserved as habitat for associated covered species.

Objective NACO2.3: Increase the extent of protected natural seasonal wetlands, including vernal pools and their micro-watersheds, within the Planning Area that are preserved as habitat for associated covered species.

Objective NACO2.4: Increase the extent of protected non-tidal perennial aquatic and associated non-tidal perennial permanent emergent marsh communities within the Planning Area that are preserved as habitat for associated covered species.

Covered Species Goals and Objectives

General Covered Fish Species

Goal GECF1: Increase the abundance of covered fish species by reducing sources of unnatural mortality.

Problem Statement: *Non-natural sources of mortality are hypothesized to ~~Poor connectivity among and accessibility to habitat areas required to fulfill the life stage requirements of covered species is hypothesized to~~ inhibit the abundance and distribution of covered species and the diversity and growth of their populations. Reducing the proportion of covered fish species populations that are subject to loss from these mortality sources will support increasing the ~~improved~~ abundance, distribution, diversity, and growth of covered fish species populations.*

Objective GECF1.1: Evaluate the ~~Reduce~~ entrainment of covered fish species at non-project diversions and reduce if shown to adversely affect them.

~~**Objective GECF1.2:** Reduce entrainment of covered fish species at the Banks Pumping Plant and the Jones Pumping Plant.~~

~~**Objective GECF1.3:** Reduce entrainment of covered fish species at~~into ~~the SWP and CVP north Delta diversion intakes in the BDCP long-term implementation period.~~

Objective GECF1.4: Contribute towards reducing the risk for dissolved oxygen sags in Delta and Suisun Marsh waterways that could result in mortality of covered fish species.

Objective GECF1.5: Minimize the adverse effects of harvest on ~~covered fish species~~all runs of salmon, green and white sturgeon, and splittail.

Goal GECF2: Reduce impacts of hatcheries on the genetic integrity of artificially propagated and natural populations of covered fish species.

Problem Statement: *Hatcheries ~~Non-natural sources of mortality~~ are hypothesized ~~to Poor connectivity among and accessibility to habitat areas required to fulfill the life stage requirements of covered species is hypothesized~~ to lower the genetic fitness and support negative ecological interactions between hatchery and wild individuals, which inhibit the abundance, life history diversity, ~~and~~ and growth ~~distribution~~ of self-sustaining populations of covered species. ~~and the diversity and growth of their populations.~~ Reducing the impacts of hatcheries on the genetic integrity and ecological interactions between propagated and wild ~~proportion of~~ covered fish species populations ~~that are subject to loss from these mortality sources~~ will support improved abundance, distribution, diversity, and growth of covered fish species populations.*

GECF2.1: Minimize the adverse effects of salmonid hatcheries on the genetic integrity of wild Chinook salmon and steelhead populations.

GECF2.2: Maintain or establish genetic refugia for delta smelt and longfin smelt to reduce the risk for the extinction of delta smelt and the extirpation of longfin smelt.

Delta Smelt

Goal DESM1: Contribute to conditions that support a viable population of delta smelt in the Delta and Suisun Bay.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.4, and GECF2.2.

~~**Objective DESM1.1:** Contribute to mMaintaining the existing distribution of delta smelt in the Delta and Suisun Bay and expanding the distribution of delta smelt in the eastern and southern Delta such that the number of gravid and spent adult delta smelt sampled from Spring Kodiak Trawl Eastern and Southern Zone survey stations is similar to that sampled from [year] to [year].~~[1]

***Alternate 1*-Objective DESM1.2:** ~~Contribute to i~~Increasinge the abundance of delta smelt within the Delta and Suisun Bay such that, in any five year period, the combined Fall Midwinter Trawl (FMWT) catch for September and October will exceed 29 in two years and the two-year running average will never fall below 84.[1]

***Alternate 2*-Objective DESM1.2:** ~~Contribute to I~~increasinge the abundance of delta smelt within the Delta and Suisun Bay such that, in any ten year period, the FMWT index will not be less than 100 and will exceed 500 in at least three years and exceed 1,000 in at least one of the ten years.[1]

~~**Objective DESM1.3:** Increase habitat availability for all delta smelt life stages in the Delta and Suisun Marsh/Bay.~~

Objective DESM1.4: Increase delta smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year].

Longfin Smelt

Goal LOSM1: Create conditions that support a viable population of longfin smelt in the Delta and Suisun Bay.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.4, and GECF2.2.

[1] This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

Objective LOSM1.1: Contribute to increasing the abundance of ~~delta~~ longfin smelt within the Delta and Suisun Bay such that, in wet water years the FMWT index will be at least 5,000 and the FMWT index does not decline below 100 in any year. [2]

Objective LOSM1.2: Increase the abundance of longfin smelt within the Delta and Suisun Bay relative to mean abundance indices for [year] to [year] based on results of FMWT surveys.

~~**Objective LOSM1.3:** Increase habitat availability for all longfin smelt life stages in the Delta and Suisun Marsh/Bay.~~

Objective LOSM1.4: Increase longfin smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year], such that in wet years the FMWT index will be at least 5000 and the FMWT will not fall below 100 in any year.
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Chinook Salmon

Goal CHIN1: Increase the survival of juvenile Chinook salmon passing through the Delta.

Problem Statement: *Mortality rates of junvenile Chinook salmon attributable to multiple factors within the Delta are hypothesized to be excessive and a factor inhibiting the growth of Chinook salmon populations. Reducing mortality rates of juvenile Chinook salmon in the Delta will support improved abundance, distribution, diversity, and growth of Chinook salmon populations.*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.5, and GECF2.1.

Objective CHIN1.1: Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island in the BDCP near-term implementation period by __ percent, fall/late fall-run Chinook salmon by __ percent, and winter-run Chinook salmon by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.2: Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island in the BDCP

[2] This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

long-term implementation period by __ percent, fall/late fall-run Chinook salmon by __ percent, and winter-run Chinook salmon by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.3: Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island in the BDCP near-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.4: Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island in the BDCP long-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective CHIN1.5: When a spawning population of spring-run Chinook salmon established in the San Joaquin River, provide for survival of San Joaquin Basin spring-run Chinook salmon passing through the Delta to Chips Island in the BDCP long-term implementation period of at least __ percent.

Goal CHIN2: Increase the growth of juvenile Chinook salmon that pass through and rear in the Delta to increase the likelihood for survival of juvenile Chinook salmon in San Francisco Bay and ocean habitats.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective CHIN2.1: Increase the mean weight and length of juvenile Sacramento Basin spring-run Chinook salmon, fall/late fall-run Chinook salmon, and winter-run Chinook salmon passing through the Delta to Chipps Island.

Objective CHIN2.2: Increase the mean weight and length of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island.

~~**Goal CHIN3:** Maintain or increase life history diversity of all runs of Chinook salmon.~~

~~***Problem Statement:*** *[To come.]*~~

~~The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.~~

~~**Objective CHIN3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for all runs of Chinook salmon over time~~.

~~**Goal CHIN4:** Increase the proportion of all runs of adult Chinook salmon that successfully migrate upstream through the Delta to upstream spawning habitats.~~

~~***Problem Statement:*** *[To come.]*~~

~~The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, GECF1.5, and GECF2.1.~~

~~**Objective CHIN4.1:** Provide flow conditions that minimize occurrences of false attraction of all runs of adult Chinook salmon into non-natal basins.~~

Objective CHIN4.2: Increase the passage of all runs of Sacramento Basin adult Chinook salmon past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

Central Valley Steelhead

Goal STEE1: Increase the survival of juvenile steelhead passing through the Delta.

Problem Statement: *Mortality rates of ju~~n~~venile Central Valley steelhead attributable to multiple factors within the Delta are hypothesized to be excessive and a factor inhibiting the growth of the steelhead population. Reducing mortality rates of juvenile steelhead in the Delta will support improved abundance, distribution, diversity, and growth of the Central Valley steelhead population.*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.5, and GECF2.1.

Objective STEE1.1: Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island in the BDCP near-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective STEE1.2: Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective STEE1.3: Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island in the BDCP near-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Objective STEE1.4: Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term implementation period by __ percent from mean survival rates observed from [year] to [year].

Goal STEE2: Increase the growth of juvenile steelhead that pass through and rear in the Delta to increase the likelihood for survival of juvenile steelhead in San Francisco Bay and ocean habitats.[r17]

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

Objective STEE2.1: Increase the mean weight and length of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island.

Objective STEE2.2: Increase the mean weight and length of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island.

Goal STEE3: Maintain or increase life history diversity of Central Valley steelhead.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

Objective STEE3.1: Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for Central Valley steelhead over time.

~~**Goal STEE4:** Increase the proportion of adult Central Valley steelhead that successfully migrate upstream through the Delta to upstream spawning habitats.~~

~~***Problem Statement:*** *[To come.]*~~

~~The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, GECF1.5, and GECF2.1.~~

~~**Objective STEE4.1:** Provide flow conditions that minimize occurrences of false attraction of all runs of steelhead into non-natal basins.~~

Objective STEE4.2: Increase the passage of steelhead past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

~~**Objective STEE4.3:** Increase the passage of San Joaquin Basin adult steelhead past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods steelhead are present.~~

Sacramento Splittail

Goal SASP1: Maintain and conserve a viable population of Sacramento splittail in the Delta.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.4, ECSY4.1-4.4, ECSY5.1-5.2, , NACO1.1-1.5, GECF1.1-1.5.

Objective SASP 1.1: Implement a new comprehensive monitoring program for Sacramento splittail in their current range with multiple mark reacapture techniques as desgned by the Department of Fish and Game. [3]

Objective SASP 1.2: Contribute towards increasing the abundance of Sacramento splittail within the Delta and Suisun Bay in the near-term implementation period such that the following conditions are met.

1. The FMWT numbers will exceed 19 or greater for seven of 15 years, the Suisun Marsh catch per trawl will exceed 3.8 for seven out of 15 years, and young-of-year abundance will exceed 3.1 per trawl for at least three out of 15 years (splittail young-of-year abundance can be applied to meet the total abundance (i.e., 3.1 young per trawl can be applied to meet the 3.8 target).

[3] This objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

2. Bay Study otter trawl numbers will be 18 or greater and catch of yound-of-year will exceed 14 for 3 out of 15 years. [4]

Objective SASP1.3: Contribute towards increasing the abundance of Sacramento splittail within the Delta and Suisun Bay in the long-term implementation period to achieve target abundance values based on the new monitoring program established under Objective SASP1.1. [5]

Objective SASP1.4: Maintain the distribution of Sacramento splittail within the Delta and Suisun Bay to achieve targets distribution values based on the new monitoring program established under Objective SASP1.1.[5]

Objective SASP1.5: Provide increased spatial availability of Sacramento splittail spawning habitats.

Objective SASP1.6: Maintain multiple spawning cohorts of Sacramento splittail as part of the breeding population as indicated by first dorsal ray aging data collected under the new monitoring program established under Objective SASP1.1.[5]

Green Sturgeon

Goal GRST1: Increase the proportion of green sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, and GECF1.5.

~~**Objective GRST1.1:** Provide flow conditions that minimize occurrences of false attraction of adult green sturgeon into non-natal basins.~~

~~**Objective GRST1.2:** Increase the passage of adult green sturgeon past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.~~

[4] This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.
[5] This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

Objective GRST1.3: Provide for the potential reestablishment of green sturgeon in the San Joaquin River by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods adult green sturgeon are migrating to spawning habitats.

Goal GRST2: Increase juvenile green sturgeon habitat availability.

Problem Statement: *[To come.]*
The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

Objective GRST 1.1: Increase the spatial distribution of juvenile green sturgeon within the Delta.

~~**Goal GRST3:** Maintain or increase life history diversity of green sturgeon.~~

~~***Problem Statement:*** *[To come.]*~~

~~The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.~~

~~**Objective GRST3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for green sturgeon over time.~~

White Sturgeon

Goal WHST1: Increase the proportion of white sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, and GECF1.5.

Objective WHST1.1: Provide flow conditions that minimize occurrences of false attraction of white sturgeon into non-natal basins.

Objective WHST1.2: Increase the passage of white sturgeon past the Fremont Weir into the Sacramento River by __ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

~~**Objective WTST1.3:** Increase the passage of white sturgeon past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen~~

~~levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods white sturgeon are present.~~

Goal WHST2: Increase juvenile white sturgeon habitat availability.

Problem Statement: *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

Objective WHST 2.1: Increase the spatial distribution of white sturgeon within the Delta.

~~**Goal WHST3:** Maintain or increase life history diversity of white sturgeon.~~

~~***Problem Statement:*** *[To come.]*~~

~~The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.~~

~~**Objective WHST3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for white sturgeon.~~

River Lamprey

Goal RILA1: Maintain the ecological functions of the Delta that support a viable population of river lamprey in the Central Valley.

Problem Statement: *[To come.]*

Objective RILA1.1: Provide flow conditions that support upstream migration of adult river lamprey through the Delta to upstream spawning habitats.

Objective RILA1.2: Maintain sufficient low salinity zone holding habitat to support the abundance of river lamprey needed to successfully metomorphosis and outmigrate from the Delta to maintain a viable Central Valley population.

Terrestrial Covered Species

[To come.]